



*Celebrating 75 Years
of Energy Efficiency*

NAIMA
NORTH AMERICAN INSULATION
MANUFACTURERS ASSOCIATION

VIA E-MAIL AND OVERNIGHT MAIL

June 7, 2010

Ruth M. Lunn, Ph.D.
Director, Report on Carcinogens Group
National Toxicology Program
National Institute of Environmental Health Sciences
MD KY-14
530 Davis Drive
Morrisville, NC 27560

RE: Comments of the North American Insulation Manufacturers Association on the
"Draft Report on Carcinogens Substance Profile for Glass Wool Fibers
(Respirable) as a Class"

Dear Dr. Lunn:

EXECUTIVE SUMMARY

The National Toxicology Program ("NTP") has before it two separate nominations related to glass wool fibers. The North American Insulation Manufacturers Association's ("NAIMA") Petition to Delist "glass wool (respirable size)," which is the focus of these comments, asks the NTP to remove the listing for glass wool from the Report on Carcinogens ("RoC"). NAIMA based its Petition for Delisting on the extensive published scientific research and the conclusions reached by both the International Agency for Research on Cancer ("IARC") in 2001 and the National Academy of Sciences ("NAS") in 2000. Specifically, IARC's decision to change the classification of glass wool insulation from Group 2B to Group 3 was supported by IARC's conclusion that the human data remained "inadequate," but the animal data for glass wool insulation was no longer "sufficient," classifying it as "limited." Subsequent to the published conclusions by IARC and NAS, the Agency for Toxic Substances and Disease Registry ("ATSDR") reached similar conclusions in 2004. The extensive published research demonstrates, as confirmed by IARC, NAS, and ATSDR, that "glass wool (respirable size)" does not meet either the criteria for human or animal evidence that are required for listing in the RoC.

NTP's Glass Wool Expert Panel (2009) unanimously recommended delisting glass fibers following the scientific data and reasoning of NAS, IARC, ATSDR, and many others. That the Draft Substance Profile does not follow the NTP Expert Panel's recommendation creates an inequitable situation in the United States. The insulation glass wool fibers that were delisted by IARC and were recommended for delisting by the NTP Glass Wool Expert Panel are not classified and labeled as carcinogens in jurisdictions outside the United States. Under this

scenario, a company in the United States could produce a glass wool exonerated fiber product at a plant in the U.S. and ship it to Europe, Canada, or anywhere else in the world without a cancer warning label. If that identical product is distributed in the United States, it may carry a cancer warning label. This is particularly problematic because the Draft Substance Profile itself acknowledges that “not all fibers within this class cause cancer.” In fact, 99 percent of all glass fibers under consideration by NTP have been removed from the IARC Group 2B list of possible carcinogens. By the dictates of its Congressional mandate, the NTP cannot publish a report containing substances not “known” or “reasonably anticipated” to be a human carcinogen, but that is precisely what will happen if the Draft Substance Profile is not modified.

There is an available resolution to this issue. The European Union (“EU”) (Note Q of the Regulation (CE) n°1272/2008) has a well-developed and documented system based on animal data to exonerate from classification as carcinogens and labeling requirements the very fibers that were recommended for delisting by the Expert Panel. The Draft Substance Profile should be revised to read as follows:

Carcinogenicity within the class of respirable glass wool fiber varies, and not all fibers within this class cause cancer. Thus, those fibers exonerated under the EU *in vivo* testing standards would not be reasonably anticipated to be a human carcinogen.

NTP should also modify the Draft Substance Profile title to more accurately characterize the two nominations before the NTP and the historic separation of these fibers by changing “Glass Wool Fiber (Respirable) as a Class” to “Certain Glass Fibers (Respirable).”

In NAIMA’s view, the suggested additional language referencing the EU criteria and test methods does not require NTP to endorse the EU protocols. Rather, the clarifying language merely provides guidance to U.S. regulatory agencies, health and safety professionals, and the public. The clarifying language also remedies the current unclear situation presented in the draft, which includes minimal guidance and, by continuing to include all glass fibers, clashes with the RoC Congressional mandate to list only those materials “known” or “reasonably anticipated” to be human carcinogens.

INTRODUCTION

The North American Insulation Manufacturers Association (“NAIMA”), an association representing the manufacturers of glass wool insulation in the United States and throughout North America, is pleased to present the following comments on the “Draft Report on Carcinogens Substance Profile for Glass Wool Fibers (Respirable) as a Class” (75 Fed. Reg. 21,003 (April 22, 2010)).

NAIMA and its members are surprised and deeply disappointed that the National Toxicology Program (“NTP”) staff preparing the “Draft Substance Profile” did not follow the Glass Wool Expert Panel’s unanimous 2009 recommendation to delist insulation glass wool from the Report on Carcinogens.

The 2009 recommendation of the panel of fiber experts, carefully selected by NTP, should be followed for several reasons. First, the Glass Wool Expert Panel's recommendation is consistent with the 2002 International Agency for Research on Cancer ("IARC") decision to delist glass wool fibers,¹ which decision was rendered by an international expert review panel after meeting and deliberating on the glass wool science for 10 days. Second, the NTP Expert Panel was selected exclusively by NTP leaders; none of NAIMA's nominations of independent world experts was included. According to NTP, the Expert Panel members were selected based on both their expertise in fiber toxicology as well as their lack of any industry affiliation. Despite having assembled a truly expert and independent Panel, NTP disregarded their recommendation and the IARC decision that guided that recommendation and upon which NAIMA's Petition for Delisting is based.

NAIMA's comments below emphasize that there is not sufficient evidence in either animals or humans to classify insulation glass wools as "reasonably anticipated to be carcinogenic." Insulation glass wools can be separated from special purpose fibers (many expert groups have done so and relied upon that separation as the basis of their classification). Indeed, NTP has admitted that some glass wool fibers are not carcinogenic. The European Union ("EU") has a system for allowing manufacturers to demonstrate that their fibers are not carcinogenic. At a minimum, NTP should do likewise.

These comments also emphasize the importance of a globally harmonized classification of insulation glass wool fibers. Such a classification may be achieved by recognition of the EU system of classification which integrates the United Nations globally harmonized system of classification and labeling, also known as the Globally Harmonized System ("GHS").²

It is also imperative that NTP recognize that there are two separate nominations before the Board of Scientific Counselors ("BSC"): (1) a Petition to Delist insulation glass wool fibers (NAIMA's nomination), and (2) a separate nomination to list "special purpose fibers" (National Institute of Environmental Health Sciences ("NIEHS") nomination).

As demonstrated below, NAIMA's Petition to Delist glass wool from the RoC is based on IARC's delisting of the same fibers and on the weight of scientific evidence, which is set forth in much greater detail in the IARC Monograph.³ The extensive published research relied upon by

¹ An international expert review panel for IARC re-evaluated the 1988 IARC assessment of glass fibers and removed glass, rock, and slag wool fibers from its list of "possibly carcinogenic to humans." Insulation glass wool fibers are now considered by IARC as "not classifiable as to carcinogenicity to humans."

² http://www.unece.org/trans/danger/publi/ghs/presentation_e.html.

³ International Agency for Research on Cancer, *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans: Man-Made Vitreous Fibres*, Vol. 81 (Lyon, France: WHO/IARC, 2002) ("IARC Monograph 81"). (<http://monographs.iarc.fr/ENG/Monographs/vol81/mono81.pdf>) IARC classified "Glasswool" as Group 2B in its 1988 Monograph. In 2002, IARC recognized the significant new scientific data which showed the need to separate "glasswool" into two distinct fibers for hazard classification purposes. IARC stated in its 2002 Monograph: "This [additional] category, termed 'special-purpose fibres' in Figure 1 and Table 1, includes, for example, fibres such as E-glass and 475-glass used for high-efficiency air filtration media, acid battery separators and certain fine-diameter glass fibres." IARC Monograph 81, p. 52.

NTP's Glass Wool Expert Panel, IARC, the Agency for Toxic Substances and Disease Registry ("ATSDR"), and other scientific bodies, establishes that glass wool insulation (respirable size) does not meet the criteria for either human or animal evidence required for listing in the RoC. Therefore, "glass wool (respirable size)" should be clearly removed from the NTP's RoC to accurately reflect the current state of the science. These comments also describe in detail the EU's recognized system of classification distinguishing and separating insulation glass wool and special purpose fibers that is consistent with IARC and the NTP's Glass Wool Expert Panel's separation of these fibers. Lastly, these comments present the substantial consequences for creating uncertainty that could isolate the United States as the only jurisdiction in which these exonerated fibers are not clearly classified and where they may need to be labeled as a carcinogen, despite the precedent established by IARC and followed by the National Academy of Sciences, the NTP Expert Panel, and many others.

THE DRAFT SUBSTANCE PROFILE RECOMMENDATION IS CONTRARY TO NTP'S AUTHORITY AND IS IN CONFLICT WITH THE INTERNATIONAL SCIENTIFIC DATA

The Draft Substance Profile creates a deep concern for the insulation glass wool fiber industry in the United States because it would create an inequitable situation where glass fibers that were delisted by IARC and recommended for delisting by the NTP Expert Panel and that are not classified as carcinogens or subject to labeling requirements in other jurisdictions in the world will be in the United States. Therefore, this inconsistency with IARC and the Expert Panel is contrary to the weight of the scientific data and misses the opportunity for a globally harmonized treatment of these fibers.

The Draft Substance Profile Does Not Fulfill the Legal Mandate of Congress

The Draft Substance Profile explicitly and correctly recognizes that the fibers within the category of "Glass Wool Fibers (Respirable) as a Class" are not "reasonably anticipated to be a human carcinogen." The Draft Substance Profile specifically declares:

- At page 1 – "Carcinogenicity within the class of respirable glass wool fibers varies, and not all fibers within this class cause cancer."
- At page 1 – "Thus the carcinogenicity of individual glass wool fibers must be evaluated on a case-by-case basis. . ."

It is important to note that when the Draft Substance Profile states "not all fibers within this class cause cancer," it really means that approximately only 1 percent of this "fiber class" has been classified by IARC as "possibly carcinogenic." Therefore, in reality, 99 percent of all glass fibers under the consideration of NTP have been removed from the IARC Group 2B list of possible carcinogens and deemed "not classifiable as to carcinogenicity to humans" (Group 3). In other words, the Draft Substance Profile's unclear recommendation casts some doubt on the vast majority of these fibers for the sake of approximately one percent of a narrowly used group of special purpose fibers.

The listing should be changed to “Certain Glass Fibers (Respirable).” NTP’s legal mandate from Congress⁴ is to “publish an annual report, which contains: A list of all substances (i) which either are known to be carcinogens [in humans] or may reasonably be anticipated to be [human] carcinogens; and (ii) to which a significant number of persons residing in the United States are exposed.” Non-carcinogenic fibers cannot be included as “reasonably anticipated;” thus they should be clearly excluded from the RoC. By the NTP’s own statement in the Draft Substance Profile, some of these fibers are not carcinogenic; therefore, NTP will not fulfill its mandate if it conveys to Congress a report that lacks adequate clarity as to which glass wool fibers are truly “reasonably anticipated to be a carcinogen.” Indeed, as the Draft Substance Profile seems to recognize, it could be misleading and scientifically unsupportable to declare all glass fibers “as a class” to be “reasonably anticipated,” while at the same time noting that some fibers have no carcinogenic potential.

As discussed more fully below, the glass fibers under discussion within the Draft Substance Profile can and have been separated and distinguished by various authoritative scientific bodies. Specifically, the European Union (“EU”) (Note Q of the Regulation (CE) n°1272/2008) has a well-developed and documented system to exonerate from classification as carcinogens and labeling requirements the very fibers that were recommended for delisting by the Expert Panel. Australia⁵ and New Zealand⁶ have also adopted a classification that recognizes biosoluble fibers and has a similar exoneration opportunity as the European regulation. Therefore, 99 percent of fibers sold in the U.S. would not be clearly and appropriately classified under the current language in the Draft Substance Profile. Such lack of clarity would fail to fulfill the legal mandate given by Congress, would ignore the weight of the scientific evidence as interpreted by IARC and other international bodies, and would neglect to directly respond to NAIMA’s Petition for Delisting.

TWO SEPARATE AND DISTINCT NOMINATIONS ARE PENDING BEFORE THE NTP

The creation and publication of the Draft Substance Profile is one step near the end of the NTP’s RoC review process. That “process” begins with the nomination and selection of candidate substances. The glass wool issues presently before the BSC began on January 28, 2002, over eight years ago, when NAIMA filed its Petition to Delist insulation glass wool with the NTP. NAIMA based its nomination for delisting on the IARC decision:

⁴ Section 301(b)(4), Public Health Services Act.

⁵ “Australian manufacturers of glass wool and rock wool have assessed and labeled their biosoluble products (FBS-1) according to the criteria of the National Occupational Health and Safety Commission (NOHSC): NOHSC:1008 (1999) and NOHSC:10005 (1999) and have assessed that their products are not classified as hazardous.” Insulation Council of Australia and New Zealand (“ICANZ”), “Glasswool & Rockwool Health & Safety,” ICANZ Fact Sheet 1. See also: www.icanz.org.au/biosolubility/.

⁶ Department of Labour, New Zealand, “Occupational Health Report Series: Number 8: 2001 Update on Synthetic Glass Wool” (2001).

This nomination for delisting is based on the recent (October 16, 2001) International Agency for Research on Cancer ("IARC") decision to downgrade the classification of "glass wool insulation" from 2B to 3 and the science supporting that decision. IARC's reclassification concluded that the human data remained "inadequate," but that the animal data was no longer "sufficient," reclassifying it as "limited."⁷

After NAIMA filed its Petition for Delisting, the National Institute of Environmental Health Sciences ("NIEHS") separately nominated "certain glass wool fibers (special purpose fibers)" for listing in the RoC. There are thus two separate and distinct nominations that have been pending for nearly a decade. These two nominations must be analyzed separately and distinctly from one another.

Unfortunately, the terms used by NTP to identify the glass wool nomination for delisting have evolved over time. Initially, NAIMA's Petition for Delisting was characterized as "glass wool (respirable size)," the term used in the prior RoC. With the addition of the NIEHS nomination, the two nominations were merged into one category entitled "Certain Glass Wool Fibers" (see 70 Fed. Reg. 60,548, 60,552 (October 18, 2005)). This prompted NAIMA to request a clarification that indeed there were two separate nominations.

In a November 9, 2005 letter to NAIMA (Attachment 1), NTP explained its intention regarding the two nominations:

[b]ased on the initial NAIMA nomination for delisting glass wool (respirable size) from the Report on Carcinogens (RoC), it is the NTP's intention to review the current listing of glass wool (respirable size) to determine if this listing should remain in or be removed from the RoC. This review will be part of the consideration of the certain glass wool fibers nomination. As indicated in the October 18, 2005 Federal Register (70 Fed. Reg. 60,552) the basis of the certain glass wool fibers nomination is the recent International Agency for Research on Cancer (IARC) finding of limited evidence of carcinogenicity in animals for insulation glass wool and its evaluation as an IARC Group 3 (not classifiable as to its carcinogenicity to humans), and the finding of sufficient evidence of carcinogenicity in animals for special-purpose glass fibers (IARC Monograph Vol. 81, 2002).

This clarification is provided so that the BSC understands that NAIMA's Petition for Delisting Glass Wool (respirable size) is separate from the NIEHS nomination to list "special purpose fibers." Last year, when the NTP Glass Wool Expert Panel met and recommended delisting of glass wool, the NTP website properly identified the two nominations under the single heading

⁷ IARC retained the Group 2B classification ("possibly carcinogenic to humans") for refractory ceramic fibers and "certain special-purpose glass wools not used as insulating materials." (See IARC Press Release at www.iarc.fr/ENG/Press_Releases/archives/pr137a.html). NAIMA's delisting nomination applies only to glass wool insulation categorized by IARC as Group 3.

“Glass Wool Fibers.” Now, the Draft Substance Profile, yet again, redefines the fibers as “glass wool fibers (respirable size) as a class.” [Emphasis added.] Thus, the Draft Substance Profile marks the first use of the phrase “as a class” and does so without prior public notice and essentially at the end of a nearly decade-long proceeding. This listing, because it includes many fibers neither “known” nor “reasonably anticipated,” should be changed.

NAIMA’s Petition for Delisting is important because it was the first step in the process that has brought about the creation of the Draft Substance Profile under discussion in these comments. Despite the different ways this nomination has been re-characterized, NAIMA still has before the NTP a Petition for Delisting, which is not acknowledged in the Draft Substance Profile.

NAIMA’s Petition for Delisting is also important because it establishes the bases for delisting. In 1988, IARC classified “glasswool” as Group 2B, possibly carcinogenic based on inadequate human data and sufficient animal data. IARC’s 1988 classification thus had no need to separate glass wool insulation from special purpose fibers. “Glasswool” included all glass fibers, except continuous glass filament fibers.

In 1994, NTP, citing the 1988 IARC decision, classified “glasswool (respirable size)” as “reasonably anticipated to be carcinogenic based on sufficient evidence of carcinogenicity of glasswool in experimental animals” and “inadequate evidence of carcinogenicity of glasswool in humans.” NTP did not define, and at that time had no need to define, “glasswool (respirable size),” but NTP, like IARC, considered the term inclusive of all glass fibers with the exception of continuous glass filaments.

In October 2001, IARC recognized that insulation glass wool and special purpose fibers were both glass wools, but IARC distinguished the two based on animal data and mechanistic evidence. The most concise description of IARC’s 2001 decision is provided in a publication by Robert Baan and Yann Grosse of IARC:

The general evaluation of the carcinogenic hazard of ‘glass wool’ was made by the Working Group in 1987 on the basis of the combined data for insulation glass wool and various other types of glass fibre By making a distinction between glass wool used for insulation and ‘special purpose’ glass fibres, the Working Group in 2001 reached more precise evaluations for these different materials.⁸

This explains the basis for NAIMA’s Petition to Delist “glass wool (respirable size).” In essence, NAIMA’s Petition is asking NTP to clearly recognize that there is a large class of glass wool fibers (approximately 99 percent of the glass fibers under consideration before NTP) that do not meet NTP’s criteria for listing as “reasonably anticipated to be carcinogenic.” That class of glass wool fibers is referred to as “glass wool insulation.” NAIMA is asking NTP to address that issue by delisting glass wool (respirable size). NIEHS’ separate nomination to list special

⁸ Baan, R.A., Grosse, Y., Man-made mineral (vitreous) fibres: evaluations of cancer hazards by the IARC Monographs Programme, *Mutation Research* 553 (2004) 43-58, p. 51. These authors, IARC Monograph staff members, explain in detail the 1988 and 2001 IARC reviews and the specific bases for the decisions made.

purpose fibers is then the appropriate avenue in which to classify the specific subgroup that IARC determined showed sufficient evidence in animals to classify as Group 2B, possibly carcinogenic.

Having recognized the distinction between insulation fibers and special purpose fibers and having made that distinction a key component of several Federal Register notices, NTP should not (and legally cannot) now undo that recognition by means of non-public, anonymous internal governmental review panels. Secret and anonymous determinations, presumably made by government employees not deeply involved in fiber toxicology or in the new biosolubility data, should be given no weight.

GLASS WOOL INSULATION FIBERS ARE DISTINCT FROM SPECIAL PURPOSE FIBERS

European Union

As noted above, the Draft Substance Profile acknowledges that “not all fibers within this class cause cancer,” yet because of an unwillingness to continue to clearly distinguish these fibers, the Profile creates uncertainty by referring to glass fibers “as a class.” The NTP also acknowledges that:

“The European Community and Germany have standardized *in vivo* testing of fibers for carcinogenicity and issued criteria for classifying the carcinogenicity of synthetic vitreous fibers. . . .”

“The European Union and Germany have established criteria for labeling and classifying synthetic vitreous fibers (including glass fibers) based on their potential to be hazardous to human health, which is dependent both on a fiber’s physical dimensions and its chemical composition. . . .”

As described in more detail below, and as noted by the Draft Substance Profile, the EU has implemented a system of classification and labeling using chemical composition and four *in vivo* protocols to establish a basis for clearly exempting from cancer classification and labeling those fibers that pass one of these four tests. As noted above, Australia and New Zealand have followed EU’s lead.

Indeed, the EU system of classification and exoneration provides a validated scientific system for differentiating and distinguishing those glass fibers that merit a cancer warning label and those that do not merit a cancer warning label. The EU system relies on chemical composition and standardized *in vivo* protocols. Exoneration from cancer classification and labeling is based on compliance with the very detailed EU Regulation criteria based on tests done according to EU guideline ECB/TM27 rev. 7:⁹

⁹ <http://tsar.jrc.ec.europa.eu/documents/Testing-Methods/mmmfweb.pdf>.

- A short-term biopersistence test by inhalation has shown that the fibers longer than 20 μm have a weighted half-life less than 10 days; or
- A short-term biopersistence test by intratracheal instillation has shown that the fibers longer than 20 μm have a weighted half-life less than 40 days; or
- An appropriate intra-peritoneal test has shown no evidence of excess carcinogenicity; or
- Absence of relevant pathogenicity and neoplastic changes in a suitable long-term inhalation test.

The methods used by the EU to develop the exoneration criteria and protocols for these four animal tests were developed in a scientifically rigorous and open manner, which is more fully described in Bernstein, *et al.* (1991).¹⁰ European fiber experts held a series of meetings and data exchanges, and “standardized biopersistence protocols were developed at the European Chemical Bureau (“ECB”) (“Ispra Protocols”).¹¹ Per the Abstract:

Biopersistence of fibers longer than 20 μm was found to be a good predictor of the lung burden and early pathological changes in chronic inhalation studies with fibers as well as of the tumor response in chronic intraperitoneal studies with fibers. The analysis that provided the scientific basis for the relationship of biopersistence to the chronic inhalation results is presented in detail.

The EU Official Journals that contain the Regulations (CE) n°1272/2008, including the exoneration criteria of Note Q and the Regulations (CE) N°790/2009 amending it, can be found respectively at:

- <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:353:0001:1355:en:PDF>
- <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:235:0001:0439:en:PDF>

NAIMA’s member companies already produce many glass wool products in the United States and Europe made of fibers that are exonerated under the animal tests referred to in the Note Q EU Regulation. Those products are not required to carry a cancer label in Europe. Based on the IARC delisting, these same products in Canada are not required to carry a cancer label. Only in the United States are these products currently required to be labeled due to the listing in the 11th RoC, which is based on the 1987 IARC determination. This incongruity between the U.S. and the rest of the industrialized world is scientifically unjustifiable, especially in light of the specific recognition contained in the Draft Substance Profile that there are glass fibers that are not “reasonably anticipated” carcinogens.

In addition to the EU exoneration system, other international and U.S. authoritative bodies have distinguished insulation glass wool and special purpose fibers. Indeed, the distinction between glass wool insulation and special purpose fibers has long been recognized by multiple authoritative scientific bodies around the world. Over the past twenty-plus years, these

¹⁰ Bernstein, D.M., Riego Sintes, J.M., Ersboell, B.K., and Kunert, Joachim, “Biopersistence of Synthetic Mineral Fibers as a Predictor of Chronic Inhalation Toxicity in Rats,” *Inhalation Toxicology*, 13:823-849, 2001.

¹¹ *Id.* At p. 825.

authoritative bodies have recognized that insulation glass wools and special purpose fibers can, and should be, distinguished. As noted above and summarized in more detail below, special purpose fibers are a very small portion of the overall category of glass wool – less than one percent. Because of the unique applications of special purpose fibers, there is minimal consumer exposure, and occupational exposures occur in controlled, non-construction worksites where work practices specifically designed for handling special purpose fibers are employed. The EU and IARC, as well as seven other authoritative groups, have recognized that distinction. A brief summary follows:

World Health Organization (“WHO”)

In 1988, the World Health Organization (“WHO”) published *Environmental Health Criteria 77: Man-made Mineral Fibres*, which separated MMMFs “into four broad groups: continuous filaments, insulation wools, refractory fibres, and special purpose fibres.”¹² The WHO distinguished special purpose fibers from insulation wools and other fibers, in part, because the “majority of special purpose fibres have smaller fibre diameters.”¹³

The WHO further explained that special purpose fibers “account for only about 1% of world production,”¹⁴ and “are used in special applications, such as high-efficiency filter papers and insulation for aircraft and space vehicles,”¹⁵ whereas glass wool insulation is used mainly for thermal and acoustical building insulation.¹⁶ See WHO Figure 3 for a detailed chart of differentiation by use.¹⁷ In distinguishing special purpose fibers from glass wool insulation, the WHO relied upon the proceedings of a WHO/IARC conference held in Copenhagen, Denmark in April 1982.¹⁸

Environment Canada and Health Canada

In 1993, Environment Canada and Health Canada, pursuant to the Canadian Environmental Protection Act, published the *Priority Substances List Assessment Report: Mineral Fibres (Man-Made Vitreous Fibres)*. Environment/Health Canada’s assessment evaluated four subsets of mineral fibers, which were identified as follows:

- Rock and slag wools, glass wools (excluding glass microfibres);
- Glass microfibres [also referred to as special purpose fibres by the Canadian document];
- Continuous glass filaments;

¹² WHO 1988. *Man-made Mineral Fibres. Environmental Health Criteria*. Vol. 77. Geneva: World Health Organization, pp. 23-24. <http://www.inchem.org/documents/ehc/ehc/ehc77.htm>.

¹³ WHO 1988, pp. 11, 25.

¹⁴ WHO 1988, p. 25.

¹⁵ WHO 1988, pp. 25, 34-35 (citations omitted).

¹⁶ WHO 1988, pp. 12, 34-35.

¹⁷ WHO 1988, p. 34.

¹⁸ WHO/IARC, *Biological effects of man-made mineral fibres, Proceedings of a WHO/IARC Conference, Copenhagen, Denmark, 20-22 April 1982*.

- Aluminosilicate refractory ceramic fibres.

Throughout the document, Environment/Health Canada consistently distinguishes glass wool insulation from special purpose fibers by specifically excluding glass microfibers from any association with glass wool insulation. See Table 2, Physical and Chemical Properties of Some Man-made Vitreous Fibres.¹⁹ Environment/Health Canada concurs with the WHO that special purpose fibres are distinguished from insulation wools in several ways: special purpose fibers have a smaller diameter than glass wool;²⁰ special purpose fibres are more durable (less bio-soluble) than glass wool;²¹ and special purpose fibres have unique applications.²² Finally, Environment/Health Canada explicitly states that “it is fully recognized that there are substantial differences in the physical and chemical properties” of “rock/slag wool, glass wool (excluding glass microfibres), special purpose glass microfibres, continuous glass filament (textile fibres), refractory ceramic fibres.”²³

Most important, Environment/Health Canada placed glass wool insulation and special purpose fibers into distinct and separate classification categories under its carcinogenicity classifications. Glass wool insulation is assigned to Group IV (unlikely to be carcinogenic to humans).²⁴ Under that same classification system, microfibers or special purpose fibers have been assigned to Group III (possibly carcinogenic to humans).²⁵

American Conference of Governmental Industrial Hygienists (“ACGIH”)

In the ACGIH series on Threshold Limit Values, the *Documentation of the Threshold Limit Values and Biological Exposure Indices for Synthetic Vitreous Fibers* offers yet another distinction between glass wool insulation and special purpose fibers. ACGIH identifies the “major categories” and typical uses of synthetic vitreous fibers (“SVFs”) as follows:

- Insulation wools, *i.e.*, glass wool and mineral wools, *e.g.*, rock wool and slag wool;
- Special purpose fibers, *e.g.*, glass fibers used in aerospace and filtration;
- Continuous glass filament, *e.g.*, textiles and reinforcement glass uses;
- Refractory fibers, including refractory ceramic fibers used for high-temperature insulation.²⁶

¹⁹ Environment Canada 1993, p. 6. http://www.hc-sc.gc.ca/ewh-semt/pubs/contaminants/psl1-lspl/mineral_fibres_minerale/index-eng.php.

²⁰ Environment Canada 1993, p. 6.

²¹ Environment Canada 1993, p. 7.

²² Environment Canada 1993, p. 9.

²³ Environment Canada 1993, p. 31.

²⁴ Environment Canada 1993, p. 33.

²⁵ Environment Canada 1993, p. 34.

²⁶ ACGIH. 2001. *Documentation of the Threshold Limit Values and Biological Exposure Indices for Synthetic Vitreous Fibers*. American Conference of Governmental Industrial Hygienists. Cincinnati, Ohio, p. 1.

ACGIH succinctly captures these differences in its description of special purpose fibers.²⁷ ACGIH distinguishes special purpose fibers from glass wool insulation and other SVFs on their fiber diameter²⁸ and chemical compositions (See Table 1),²⁹ biosolubility,³⁰ and use.³¹

International Labour Organisation

The International Labour Organisation (“ILO”) is a specialized agency of the United Nations that deals with labor issues. During a ten-day expert panel meeting that included international experts of labor unions, governments, and industry, the ILO updated its Code of Practice for insulation wools in 2000 and distinguished glass wool insulation from special purpose fibers by excluding special purpose fibers from the Code of Practice.³² This Code was based, in part, on the earlier 1989 ILO health risk assessment for mineral and synthetic fibers and the 1988 IARC classification. The ILO experts in 1989 categorized the types of mineral and synthetic fibers as follows: 1) Continuous filament glass fibres; 2) Insulation wools (glass wool, rock wool, and slag wool); 3) Refractory fibres; and 4) Special purpose glass fibres. As have most other expert groups, ILO distinguished insulation wools from special purpose fibers based on fiber diameter, use or non-use of binders, and applications or uses.³³

International Agency for Research on Cancer

The most extensive scientific analysis was conducted over ten days in 2001 by a Working Group of Experts convened by the International Agency for Research on Cancer (“IARC”) (Vol. 81), which separated glass wool insulation from special purpose fibers in its classification system using similar principles and data.³⁴ IARC based this distinction on durability, chemical composition, applications, health effects data, and classifications by other expert entities.

IARC recognized the critical importance of durability and biosolubility in fiber toxicity³⁵ and distinguished glass wool from special purpose fibers based on durability.³⁶ Thus, special purpose fibers are typically more durable than insulation wools – in some instances, by an order of magnitude both as measured *in vitro* by K_{dis} and *in vivo* by $T_{1/2}$ and $WT_{1/2}$ in well-designed animal inhalation studies. The durability of special purpose fibers is due, in part, to their chemistry and the method of manufacture.

²⁷ ACGIH 2001, p. 6.

²⁸ ACGIH 2001, p. 3.

²⁹ ACGIH 2001, p. 4.

³⁰ ACGIH 2001, p. 3.

³¹ ACGIH 2001, p. 5.

³² International Labour Organization. *Code of practice on safety in the use of synthetic vitreous fibre insulation wools (glass wool, rock wool, slag wool)*. International Labour Office, Geneva. 2001, p. 3.

³³ International Labour Organization (ILO). *Safety in the use of mineral and synthetic fibres*. Occupational Safety and Health Series. International Labour Office, Geneva. 1990. pp. 9-11.

³⁴ IARC Monograph 81, pp. 44, 338-339.

³⁵ IARC Monograph 81, pp. 334-335.

³⁶ IARC Monograph 81, pp. 258-259 – Table 65; pp. 257-263.

IARC also recognized that special purpose fibers are more highly engineered, make up a very small percentage of the man-made vitreous fiber market, and have highly specialized applications as already noted herein.³⁷

Most importantly, IARC recognized that voluminous, high-quality scientific data supported differentiation between glass wool insulation and special purpose fibers. For example, the animal studies database for glass wool insulation is composed of data from well-designed, chronic inhalation studies that found no increase in pulmonary fibrosis, lung, or pleural tumors. These study results led the IARC Working Group to classify the animal evidence for glass wool insulation as “limited.” IARC found overall that the evidence of carcinogenicity in humans was “inadequate” for both glass wool insulation and special purpose fibers as it had in its original classification in 1988. In contrast, the special purpose fibers database contains positive carcinogenicity data from animal inhalation and intratracheal instillation studies, which led the Working Group to find the animal evidence “sufficient.”

Lastly, IARC recognized and relied upon many of the authoritative bodies cited and quoted above to further support its conclusion that glass wool insulation was markedly different from special purpose fibers and merited a separate and distinct IARC classification. IARC classified glass wool insulation, along with rock and slag wools and continuous filament glass in Group 3, not classifiable as to carcinogenicity to humans. In contrast, refractory ceramic fibers and special purpose fibers remained in Group 2B, possibly carcinogenic to humans, because of their relatively high biopersistence and animal data.

Health Council of the Netherlands

The Dutch Expert Committee on Occupational Standards, a Committee of the Health Council of the Netherlands, issued the report *Man-Made Mineral Fibers (MMMF)* in September 1995.³⁸ The Expert Committee, composed of European experts on fiber toxicology and industrial hygiene, distinguished six groups of MMMF depending on composition:

1. Continuous filament fiber glass;
2. Glass wool fibers;
3. Rock wool fibers;
4. Slag wool fibers;
5. Refractory ceramic fibers (RCF);
6. Special purpose glass fibers.³⁹

Agency for Toxic Substances and Disease Registry (“ATSDR”)

The U.S. Agency for Toxic Substances and Disease Registry (“ATSDR”) published its completed *Toxicological Profile for Synthetic Vitreous Fibers* in September 2004. The ATSDR

³⁷ IARC Monograph 81, pp. 52, 72, 78.

³⁸ Health Council of the Netherlands. *Man Made Mineral Fibers (MMMF): Health based recommended occupational exposure limits*. No. 1995/02 WGD, The Hague. September 8, 1995.

³⁹ Health Council of the Netherlands 1995, p. 19.

also distinguished glass wool insulation and special purpose fibers. Consistent with IARC and many others, the ATSDR classified synthetic vitreous fibers into two broad categories: filaments and wools. See Figure 2-1.⁴⁰ The ATSDR then differentiated both glass wool insulation and special purpose fibers by use, diameter, and manufacturing process: “Glass wool[s] . . . are primarily used in insulating materials for homes, buildings” The special purpose fiber group “includes glass fibers produced by flame attenuation for special applications such as high-efficiency air filtration and include special fine-diameter glass fibers.”⁴¹

Again, consistent with IARC, the ATSDR distinguished glass wool insulation from special purpose fibers because there was sufficient evidence in animals for the carcinogenicity of special purpose fibers and limited evidence in animals for the carcinogenicity of glass wool insulation.

AFSSET in France

The French Agency for Environmental and Occupational Health Safety (“AFSSET”) published two separate reports on man-made mineral fibers: first in January 2007 for ceramic fibers and special purpose fibers⁴² and the second in October 2008 for mineral wools (glass, stone, and slag wools) and continuous filaments.⁴³ Distinction between insulation glass wool and special purpose fibers is clearly made by being published in two separate reports and is also described in these reports as separate and distinct fibers.⁴⁴

NTP’s Glass Wool Expert Panel

As noted above, NTP’s Glass Wool Expert Panel recommended by a vote of 8 yes/0 no that glass wool fiber, with the exception of special fibers of concern, should not be classified either as known to be a human carcinogen or reasonably anticipated to be a human carcinogen. The Expert Panel also recommended that special purpose glass fibers with the physical characteristics as follows – longer, thinner, less soluble fibers (for example, $\geq 15 \mu\text{m}$ length with a k_{dis} of $\leq 100 \text{ ng/cm}^2/\text{h}$) – are reasonably anticipated to be a carcinogen.

In discussing the separation of glass fibers into two groups – glass wools and special purpose fibers, the NTP Expert Panel stated:

Glass fibers may be physically (not by use) divided broadly into: 1) glass wools with relatively large diameters, high biosolubilities, and low biopersistence; and

⁴⁰ *Toxicological Profile for Synthetic Vitreous Fibers* (U.S. Department of Health and Human Services, Public Health Services, Agency for Toxic Substances and Disease Registry), September 2004 (“ATSDR 2004”), p. 14.

⁴¹ ATSDR 2004, p. 13. <http://www.atsdr.cdc.gov/toxprofiles/tp161.pdf>.

⁴² Rapport final relative aux fibres ceramiques refractaires et aux fibres de verre a usage special. AFSSET, 2007. http://www.afsset.fr/upload/bibliotheque/656045413077262505142473979750/12_fibres_minerales_artificielles_rapport_afsset.pdf.

⁴³ Les fibres minerales artificielles siliceuses. Laines minerales, filaments continus de verre. AFSSET, 2008. http://www.afsset.fr/upload/bibliotheque/311250017979991828532705823785/fibres_minerales_artificielles_siliceuses_2008.pdf.

⁴⁴ AFSSET 2008, Figure 1, p. 29.

2) special purpose fibers that are generally characterized by relatively smaller diameters, lower biosolubilities, and higher biopersistence.

The chemical compositions of these fibers (i.e., various metal oxides dissolved within the glass) contribute to the variability in biopersistence and biosolubility of the fibers. Relatively long fibers (approximately $> 15 \mu\text{m}$) are important because macrophages have difficulty clearing fibers that are longer than the macrophage diameter and may result in death of the macrophage and release of inflammatory mediators. In order to provide some guidance to distinguish these two types of fibers, our review of the literature suggests that fibers with a k_{dis} of $\geq 100 \text{ ng/cm}^2/\text{h}$ and lengths $\geq 15 \mu\text{m}$ are unlikely to be of particular concern.

Industry Practice

Like the authoritative groups described above, glass fibers tested in health effects studies have also been distinguished by the industry that produces glass wool insulation and special purpose fibers with reference to durability, typical end uses, chemical composition, fiber diameter, and manufacturing methods.

NAIMA and its member companies have defined for many years, and will in the future define, glass wool insulation, as the authoritative bodies discussed above have recognized, by the following characteristics:

- Glass wool insulation is more biosoluble than special purpose fibers – in some instances, by an order of magnitude or more, both as measured *in vitro* by K_{dis} and by $T_{1/2}$ and $WT_{1/2}$ in well-designed animal inhalation studies. More specifically, any glass fiber manufactured within the range of dissolution rates similar to or more biosoluble than the solubility of MMVF 10 and MMVF 11 will continue to be a glass wool insulation fiber and not a special purpose fiber.
- The vast majority (approximately 90 percent) of glass wool insulation fibers are manufactured by a rotary process.
- Glass wool insulation fibers have larger average fiber diameters compared with special purpose fibers, which are distinguished by smaller average diameters.
- Glass wool insulation is used for thermal and acoustical insulation in a variety of settings, mainly residential, commercial, and industrial buildings. In addition, glass wool insulation fibers are typically used for pipe insulation, duct board and duct liner.

Establishing this delineation is relevant from a practical perspective. Substances that are listed in the NTP's RoC as a "reasonably anticipated" carcinogen are required under the OSHA Hazard Communication Standard to print a warning label on product packages and disclose the listing on material safety data sheets ("MSDS").⁴⁵ Moreover, a more clear NTP delineation would assure

⁴⁵ Importantly, and as noted above, the Draft Substance Profile does explicitly recognize that certain glass fibers do not present a cancer hazard. These fibers should not be considered "reasonably anticipated to cause cancer" for

that the U.S. fibers would be treated like similar fibers throughout the world. Consistent recognition of the differentiation of these fibers is critical to achieving a globally harmonized system of classification and hazard communication. The industry will use the delineation set forth above, and requested for the final Substance Profile, to make those labeling and disclosure determinations dictated by the Hazard Communication Standard.

BASIS FOR DELISTING INSULATION GLASS WOOLS FROM RoC

In applying the NTP RoC Listing Criteria to the extensive scientific data, glass wool insulation (respirable size) should be removed from the 12th RoC. This outcome is supported by the NTP Glass Wool Expert Panel. "The Expert Panel recommended by a vote of 8 yes/0 no that glass wool fibers, with the exception of special fibers of concern . . . should not be classified either as known to be a human carcinogen or reasonably anticipated to be a human carcinogen."⁴⁶ It is also supported by the IARC Working Group's review and its decision to change the classification of glass wool insulation from Group 2B to Group 3 and by the substantial body of science data supporting that decision. Subsequent to the publication of the IARC Monograph in 2002, the ATSDR analyzed the data in detail and reached conclusions consistent with that of IARC concerning glass wool insulation.

The delisting of glass wool is in harmony with the way the rest of the world views these fibers.⁴⁷ Delisting glass wool alleviates the dichotomy of identical products potentially carrying no cancer warning label in Europe, Canada, and throughout the world, yet potentially having such a warning in the United States. Moreover, most glass wool products in the United States are or could be exonerated under the Note Q EU Regulation.

Human Data

The Draft Substance Profile does not raise any issues regarding the large amount of human data that all authoritative bodies, including NTP, have determined are inadequate to consider any glass fibers potentially carcinogenic in humans.

In the original 1988 classification, the IARC re-evaluation contained in Monograph 81 (2002) and the NTP's Glass Wool Expert Panel, the human data were determined to be "inadequate." In

purposes of the RoC and would not have to be labeled as a potential carcinogen under the OSHA Hazard Communication Standard.

⁴⁶ Glass Wool Fibers Expert Panel Report, Recommendation for Listing Status for Glass Wool Fibers and Scientific Justification for the Recommendation, July 21, 2009.

⁴⁷ Exoneration is based on compliance with the very detailed EU Regulation criteria based on tests done according to EU guideline ECB/TM27 rev. 7:

- A short-term biopersistence test by inhalation has shown that the fibers longer than 20 µm have a weighted half-life less than 10 days; or
- A short-term biopersistence test by intratracheal instillation has shown that the fibers longer than 20 µm have a weighted half-life less than 40 days; or
- An appropriate intra-peritoneal test has shown no evidence of excess carcinogenicity; or
- Absence of relevant pathogenicity and neoplastic changes in a suitable long-term inhalation test.

the years between reviews, the cohort studies were updated, expanded and subjected to more rigorous analyses. IARC summarized the key available cohort data:

The United States cohort study included 16 plants, extended [since 1988] the follow-up to 1992 and expanded a previous cohort to include women and non-white workers. This study included information on smoking habits and a new assessment of historical workplace exposure to respirable fibres and several sources of co-exposures including asbestos, formaldehyde and silica. The European cohort extended the follow-up to 1990 in 13 plants.⁴⁸

Thus, a very large and high-quality database covering nearly a million person years of exposure is now available on the epidemiology of glass wool manufacturing workers, which IARC summarized shortly after the Working Group completed its review:

Epidemiologic studies published during the 15 years since the previous IARC Monograph[']s review of these fibres in 1988 provide **no evidence** of increased risks of lung cancer or of mesothelioma (cancer of the lining of the body cavities) from occupational exposures during manufacture of these materials, and inadequate evidence overall of any cancer risk.⁴⁹ (emphasis added)

These epidemiological data, discussed in detail by IARC and the ATSDR, show no causal relationship between manufacturing workers exposure to glass wool and cancer. This conclusion is consistent with the animal inhalation studies of glass wool insulations (MMVF 10 and MMVF 11), as well as numerous biopersistence studies showing these glass wool insulations to be biosoluble, both *in vivo* and *in vitro*.

Nonetheless, IARC in 2002 expressed “some concern” about “risks for workers in industries that use or remove these products (e.g., construction), who may have experienced higher, but perhaps more intermittent, exposure.”⁵⁰ That concern was answered in a study of fiber glass exposure that compared professional and do-it-yourself installers’ “estimated working lifetime exposures” to the cumulative lifetime exposures of manufacturing workers studied in the Marsh cohort. The authors concluded that both end user groups “are likely to have substantially lower cumulative lifetime exposures than the manufacturing cohorts.”⁵¹ ATSDR summarized this study and “concluded that due to smaller exposure times, both do it yourself and professional insulation installers had much lower lifetime exposures than workers employed in the manufacturing of fiberglass. . . products.”⁵² ATSDR further noted that “recent epidemiological studies have

⁴⁸ IARC Monograph 81, p. 328.

⁴⁹ See IARC Press Release, 24 October 2001, available at <http://www.iarc.fr/en/media-centre/pr/2001/pr137.html> (last visited May 20, 2009).

⁵⁰ IARC Monograph 81, p. 331.

⁵¹ Maxim, L.D., Eastes, W., Hadley, J.G., Carter, C.M., Reynolds, J.W., and Niebo, R., Fiber glass and rock/slag wool exposure of professional and do-it-yourself installers, *Regulatory Toxicology and Pharmacology* 37 (2003) 28-44, p. 28.

⁵² ATSDR 2004, p. 193 (citation omitted).

concluded that there is no significant increase in respiratory system cancer among the manufacturing cohorts, and therefore, there is even less risk for installers.”⁵³

Animal Data for Insulation Wools Is Insufficient To Support RoC Listing

NAIMA references with approval the comments on the animal data submitted by Drs. Hesterberg, Donaldson, Hadley, and McClellan-Hahn.

IARC in 2002 concluded, after extensive review and analysis of newly available data, that the animal evidence for glass wool insulation was “limited.” In the prior 1988 IARC review, the well-conducted chronic inhalation studies of rats and hamsters exposed to glass wool insulation were not available, and it thus did not separate glass wool insulation from special purpose fibers. Therefore, it found “glasswool,” the combined body of fibers, to have “sufficient” animal evidence based on intraperitoneal studies.

The 2002 IARC reclassification to Group 3 was based upon: (1) well-conducted chronic inhalation studies in two species (rats and hamsters) which showed no evidence of either fibrosis or tumors induced by nose-only exposures to glass wool insulations (MMVF 10 and MMVF 11); and (2) the accumulated body of evidence showing glass wool insulation fibers to be less persistent and to be less durable than other fibers that had shown carcinogenicity in laboratory animals. A growing consensus has concluded that, when all relevant data are considered, well-conducted chronic inhalation studies are more probative of potential human hazard than are injection studies.

First and foremost, the chronic animal inhalation studies significantly expanded the data available to IARC and were key to both its hazard reclassification and fiber distinction decisions. These studies are well analyzed by IARC⁵⁴ and ATSDR,⁵⁵ as well as by the additional written comments on the Draft Substance Profile from Drs. Hesterberg, Hadley, and McClellan-Hahn.

For example, Dr. Hesterberg describes the history of fiber testing under a variety of protocols with special emphasis on how the protocols for the RCC inhalation studies were carefully developed. The RCC studies are placed in the proper perspective by describing not only the results for MMVF 10 and 11, the insulation wools, but the other six fibers tested and the two positive controls, amosite and crocidolite asbestos. The seven other fibers tested were MMVF 32 (Special Purpose E Glass), RCF 1a (refractory ceramic fiber), MMVF 33 (Special Purpose 475 Glass), MMVF 21 (rock wool), X607 (Hybrid SVF), MMVF 22 (Slag Wool), and MMVF 32 (Stonewool). While none of these seven fibers are specifically at issue in development of the 12th RoC, the full data set provides persuasive support for the validity of the RCC test protocol and results of MMVF 10 and 11. Dr. Hesterberg further describes the development of biopersistence protocols that were the foundation for those included in the EU classification system described above.

⁵³ ATSDR 2004, p. 193 (citation omitted).

⁵⁴ IARC Monograph 81, pp. 181-191, 332.

⁵⁵ ATSDR 2004, p. 96-107.

The second major factor leading to IARC's reclassification of the animal evidence to "limited" was the consensus as to the critical importance of routes of exposure for hazard assessment. See, for example, Chapter 5 of the National Research Council ("NRC") Report: "It appears reasonable to conclude that extrapolations from animal toxicity data to humans for MVF can best be made when experimental animals are exposed to fibers via inhalation."⁵⁶ Additionally, regarding the issue of intracavitary injection studies, the same NRC report states: "The subcommittee agrees with a WHO scientific panel's conclusion that the intraperitoneal model should not be used for quantitative risk assessment or for comparing relative hazards posed by different fibers (WHO 1992)."⁵⁷ In 1996, a workshop report sponsored by EPA in collaboration with NIEHS, NIOSH, and OSHA,⁵⁸ similarly concluded: "After extensive discussion and debate of the workshop issues, the general consensus of the expert panel is that chronic inhalation studies of fibers in the rat are the most appropriate tests for predicting inhalation hazard and risk of fibers to humans."⁵⁹ See also Dr. Thomas Hesterberg's comments at p. 9 ("by the early 1990s generally accepted that results in the non-physiological exposure studies cannot be assumed to be predictive of results . . . in laboratory animal inhalation studies and . . . in people exposed by inhalation").

The now well-established role of fiber biopersistence in the potential biological activity of fibers also played an important role in the EU system and in the IARC reevaluation of the animal data: "It is important to appreciate the degree to which biopersistence plays a role in the different studies and end-points under review, as this property of fibres is thought to be critical in determining chronic toxicity and carcinogenic outcome in humans and in experimental animal systems."⁶⁰ See also Dr. John Hadley's comments.

The Draft Substance Profile's discussion of various *in vitro* studies of such endpoints as genotoxicity and cytotoxicity is flawed because it fails to take into account the impact of biopersistence. This is explained by Dr. Kenneth Donaldson, who concludes that these short-term assays are likely to generate false positives:

Despite having given over 40 lines to describing the key role of biopersistence, the Draft [Substance Profile] Report then gives 30 lines to describe *in vitro* bioassay studies demonstrating various endpoints such as cytotoxicity, pro-inflammatory effects and genotoxic effects that are in general fibre length dependent – long fibres being more potent than short fibres. However this latter section disregards the key role of biopersistence and the obvious disconnect between the timescale for such *in vitro* assays (24 hours – 72 hours at the most)

⁵⁶ National Research Council, *Review of the U.S. Navy's Exposure Standard for Manufactured Vitreous Fibers* (2000), p. 39.

⁵⁷ *Ibid.*

⁵⁸ Vu, V., Barrett, J.C., Roycroft, J., Schuman, L., Dankovic, D., Baron, P., Martonen, T., Pepelko, W., and Lai, D., Workshop Report, Chronic Inhalation Toxicity and Carcinogenicity Testing of Respirable Fibrous Particles, *Regulatory Toxicology and Pharmacology* 24 (1996) 202-212.

⁵⁹ *Ibid.*, p. 202.

⁶⁰ IARC Monograph 81, p. 289.

and the clearance half-times of long glass wool fibres (2 – 85 days) due to their variation in biopersistence. Clearly, even if the conditions in an *in vitro* cell culture genotoxicity assay were to mimic the conditions in the lungs that lead to dissolution of long fibres, the timescale of *in vitro* assays are only a fraction of the retention half-time of the fastest-dissolving fibres, i.e., for the great majority of glass wools the retention half-time greatly exceeds the length of an *in vitro* genotoxicity test. Therefore biopersistence, which is a key modifier of the carcinogenicity of non-biopersistent long fibres *in vivo*, cannot play a role in such *in vitro* assays, inevitably leading to false positives in *in vitro* genotoxicity tests of non-biopersistent long fibres such as insulation glass wools. (emphasis in original) (p. 3)

THE MITCHELL AND MOORMAN DATA DO NOT SUPPORT A CONCLUSION THAT INSULATION WOOL EXPOSURE CAUSED MONONUCLEAR CELL LEUKEMIA (“MCL”)

Drs. Roger McClellan and Fletcher Hahn’s comments have an extensive analysis, including new data tables, of the Mitchell and Moorman study done by Battelle under contract to NIOSH. They conclude that the F01 insulation wool exposed F344 rats did not receive much, if any, exposure:

The [Mitchell and Moorman full] report states – ‘Approximately the same number of fibers were found in the control animals as those exposed to the large diameter fibers (F01),’ Table J-13 reported 236, 938 and 834 particles per gram of dry lung, $\times 10^{-6}$ for Groups F02, F03 and F04, respectively. Thus, **the fiber lung burden data confirms the earlier conclusion based on the size distribution of the aerosol to which the rats in Group F01 were exposed – this group exposed to glass wool insulating fiber was essentially a second control group.** (emphasis added) (p. 21)

Drs. McClellan and Hahn further note that the MCL incidence in the four treated animal groups “are remarkably similar to the incidence reported by Haseman et al. (1998) for F344 control rats. . . In summary, it appears not so much that the treated groups in the Mitchell et al. (1982) study have an elevated incidence but that the incidence in the controls is unusually low.” (p. 22)

These comments also discuss current statistical recommendations from the FDA, Dr. Joe Haseman, and others that, in the circumstances of the Mitchell and Moorman data, “[t]he recommendation by Thomas et al. (2007) based on the FDA Guidance (2001) is to use a value $P < 0.01$ for a pair-wise comparison and a value $P < 0.05$ for a trend test. . .” (p. 22)

The F01 (insulation wool) group does not meet this statistical test. Accordingly, not only did the F01 group not receive the reported dose due to the non-inhalable size of the fibers, but the appropriate statistical tests show an absence of statistical significance.

Drs. McClellan and Hahn, after noting that IARC 2002 and the NTP Expert Panel did not have the full study report and appendices, conclude:

In view of the evidence reviewed above, based on the complete final report of Mitchell et al. (1982), it is our opinion that both expert groups would have likely concluded there is no evidence of carcinogenicity in animals for inhaled glass wool insulation fibers from well-conducted long-term inhalation studies. . . (p. 23)

Moreover, the Battelle study itself does not attribute the MCL to fiber exposure:

. . . the reason for the ‘increased incidence of mononuclear cell leukemia in test groups as compared to the control group in this study is not apparent. The possibility of an exposure related increase in incidence of this neoplasm cannot be ruled out.’ Battelle Study Report, p. 291. (pdf p. 312)

As noted in NAIMA’s earlier letter from Dr. Hadley and in the more detailed analysis of Drs. McClellan and Hahn, this does not constitute “sufficient” evidence of cancer in this animal study. Thus, the animal data for insulation wools is, as IARC 2002 also concluded, “limited.”

The Draft Substance Profile does a disservice to the mission of the RoC to communicate broadly the hazards of materials reviewed. Reporting studies by Stanton, Pott, and others who used non-physiologic routes of administration as equally informative as the chronic inhalation data is misleading. There is a broad consensus among fiber toxicity experts that much greater weight should be given to more recent quality chronic inhalation studies. This view is reflected by IARC, NTP’s Expert Panel, and the many other authoritative reviews summarized above. Non-fiber experts charged with using the RoC Profiles to develop industrial hygiene programs, product stewardship programs, MSDSs, and with making other important decisions are poorly served by the Draft Substance Profile. While the Draft Substance Profile acknowledges many fibers do not have a cancer hazard, it provides virtually no guidance on how to clearly differentiate those fibers.

POTENTIALLY CONFLICTING LABELING REQUIREMENTS COULD PRODUCE UNFAIR AND UNDESIRABLE CONSEQUENCES

By ignoring the 2002 IARC reclassification of glass wool and NTP’s Glass Wool Expert Panel’s unanimous 2009 recommendation for delisting, the Draft Substance Profile creates a serious lack of clarity in the United States and undermines the opportunity for a globally harmonized treatment of these fibers. If not clarified, the insulation glass wool fibers delisted by IARC and recommended for delisting by NTP’s Expert Panel may need to carry a carcinogen label in the United States, even though in no other jurisdiction in the world would such a requirement be imposed on exonerated fibers, including Canada, Europe, Australia, New Zealand, Asia, and elsewhere. Under this scenario, a company in the United States could produce an exonerated glass wool product at a plant in the U.S. and ship it to Europe, Canada, or anywhere else in the world without a cancer warning label. If that identical product is distributed in the United States, it may carry a cancer warning label. The consequences of such disparity in the competitive marketplace are not hard to imagine. More significantly, the lack of harmony in regulatory treatment of glass fibers undermines current efforts to create a globally harmonized system of

labeling and classification of substances. A distinction based merely on geographic or governmental jurisdiction is illogical and scientifically unsupportable. There is no reason for such disparity when the same science being used throughout the world to justify no labeling of glass wool is already noted in the Draft Substance Profile.

CONCLUSION

First, NAIMA advocates a delisting of insulation glass wool consistent with the weight of the scientific evidence, the 2002 IARC decision to delist glass wool, and the NTP Expert Panel's recommendation to delist insulation glass wool from the RoC. Second, NAIMA strongly recommends that the title characterization of the Draft Substance Profile be changed from "Glass Wool Fibers (Respirable) as a Class" to "Certain Glass Fibers (Respirable)." This change would be consistent with the NIEHS nomination of special purpose fibers. Such a change would also recognize and acknowledge that there are fibers within that very large "class" that do not qualify for listing. Since this exercise – the Draft Substance Profile, the Glass Wool Expert Panel, and the hearings held by the BSC – are all centered around a nomination to delist insulation glass wool and a separate and distinct nomination to list special purpose fibers, it is appropriate and necessary for the Final Substance Profile to accurately reflect what is to be listed. To do otherwise would conflict with NTP's statutory requirement to list only those materials "known" or "reasonably anticipated." Third, NAIMA requests needed clarification to the Draft Substance Profile, specifically some clarifying statements in the final Substance Profile. Specifically, NAIMA suggests that the first full paragraph under the "Carcinogenicity" heading on the first page of the draft Substance Profile read as follows:

Carcinogenicity within the class of respirable glass wool fiber varies, and not all fibers within this class cause cancer. Thus, those fibers exonerated under the EU *in vivo* testing standards would not be reasonably anticipated to be a human carcinogen.

A similar conforming change to page 9 would read as follows:

Carcinogenicity within the class of respirable glass wool fibers varies, and not all fibers within this class cause cancer. Thus, those fibers exonerated under the EU *in vivo* testing standards are not considered to have "reasonably anticipated" status in the *Report on Carcinogens*.

The title for the listing should be changed to "Certain Glass Fibers (Respirable)."

These three clarifications would both harmonize the Substance Profile with all other hazard classification determinations worldwide and further promote the NTP's goal of providing incentives to manufacturers to move to ever more biosoluble and less hazardous fibers.

These important clarifications would conform to NTP's Congressional mandate and resolve the potential inconsistency in the international scientific community that would result from adoption of the current version of the Draft Substance Profile. Most significantly, this harmonization of

labeling requirements sustains and preserves U.S. manufacturers' commitment to produce biosoluble fibers. If a lack of clarity in the final Substance Profile could lead to the incorrect conclusion that could require a carcinogen labeling requirement even for biosoluble fibers, there is little incentive to maintain the currently high biosolubility of insulation glass wools.

In addition to delisting, establishing a clear delineation, based on the EU exoneration criteria, between glass wool fibers and special purpose fibers is a practical solution to the Draft Substance Profile's conflict with NTP's legal limitation to list only "known" or "reasonably anticipated" carcinogens. It also resolves the conflict with the European, Australian, Canadian, and other international regulation of glass fibers. Substances that are listed in the NTP's RoC as a "reasonably anticipated" carcinogen are required under the OSHA Hazard Communication Standard to print a warning label on product packages and disclose the listing on material safety data sheets ("MSDS"). The industry will use the clear delineation set forth in the EU exoneration criteria, and label those products that do meet the criteria's requirements.

Sincerely,

(Redacted)

Angus E. Crane
Executive Vice President, General Counsel

Enclosure

cc: John R. Bucher, Ph.D.
Associate Director
National Toxicology Program
National Institute of Environmental Health Sciences
Mail Drop: K2-02
530 Davis Drive
Morrisville, NC 27560



National Institutes of Health
National Institute of
Environmental Health Sciences
P.O. Box 12233
Research Triangle Park, N.C. 27709
Website: www.niehs.nih.gov

November 9, 2005

Angus E. Crane
Vice President, General Counsel
North American Insulation Manufacturers Association ("NAIMA")
44 Canal Ctr Plaza
Alexandria, VA 22314

Dear Mr. Crane,

Pursuant to November 4, 2005 letter I would like to clarify what action the National Toxicology Program (NTP) will take for the review of certain glass wool fibers.

First I would emphasize that based on the initial NAIMA nomination for delisting glass wool (respirable size) from the Report on Carcinogens (RoC), it is the NTP's intention to review the current listing of glass wool (respirable size) to determine if this listing should remain in or be removed from the RoC. This review will be part of the consideration of the certain glass wool fibers nomination. As indicated in the October 18, 2005 Federal Register (70 Fed. Reg. 60,552) the basis of the certain glass wool fibers nomination is the recent International Agency for Research on Cancer (IARC) finding of limited evidence of carcinogenicity in animals for insulation glass wool and its evaluation as an IARC Group 3 (not classifiable as to its carcinogenicity to humans), and the finding of sufficient evidence of carcinogenicity in animals for special-purpose glass fibers (IARC Monograph Vol. 81, 2002).

I hope this clarifies what action the NTP intends for the certain glass wool fibers nomination and apologize for any confusion the latest Federal Register notice may have caused. Please contact me if you have any additional questions.

Sincerely,

(Redacted)

C.W. Jameson, Ph.D.
Head, Report on Carcinogens
National Toxicology Program

cc:
Dr. J. Bucher